

REMARKS

Reconsideration and allowance of the present application based on the following remarks are respectfully requested.

Upon entry of this Amendment, claims 1-8, 10, and 14-44 will be pending in this application.

Applicants are pleased to note that the Examiner indicated that claims 41-42 and 44 are allowed and claim 43 would be allowable if rewritten to overcome the rejection(s) under 35 U.S.C. § 112, second paragraph and to include all the limitations of the base claim and any intervening claims.

Claim Rejection – 35 USC § 112

Claims 1-8, 10, 14-19, 21, 39, 43 were rejected under 35 U.S.C. § 112, second paragraph.

Claims 1, 15, 21, 39, and 43 have been amended to recite “wherein said relatively inert material is selected from the group consisting of...”

Consequently, the Applicants respectfully submit that all pending claims are in full compliance with 35 USC §112, second paragraph.

Claim Rejection – 35 USC § 103

Claims 1-8, 10, 14-40 were rejected under 35 USC 103 (a) over Mori *et al.* (US Pat. No. 6,268,904) in view of Montcalm *et al.* (US Pat. No. 5,958,605).

The applicant respectfully traverses this rejection for at least the following reasons. The Office Action contends that Mori *et al.* disclose a projection optical system comprising substantially all basic features of the instant claims. The Office Action admits, however, that Mori *et al.* do not expressly disclose one of the optical elements in the illumination optical system or in the projection system such as a sensor or a lens or a reflector having a surface which is relatively coated by a relatively inert material capping layer such as diamond-like carbon, boron nitride, boron carbide, silicon nitride, silicon carbide, B, Pd, Ru, Rh, Au, MgF₂, LiF, C₂F₄, TiN, compounds and alloys. The Office action contends that Montcalm *et al.* disclose an extreme ultraviolet projection apparatus having optical elements with a “relatively inert material” including “molybdenum-silicon, molybdenum carbide-silicon, molybdenum-beryllium and molybdenum-beryllium and molybdenum carbide-beryllium or carbon and palladium, or compound material such as carbides, borides, nitrides, and oxides”

deposited for the purpose of preventing oxidation and corrosion and thus it would have been obvious to one of ordinary skill in the art to incorporate the teachings of Mori *et al.* and Montcalm *et al.* to obtain the invention as claimed.

Furthermore, in response to arguments filed July 26, 2002, the Office Action contends that Montcalm *et al.* meet the limitation "wherein said relatively inert material is selected from the group comprising diamond-like carbon, boron nitride, silicon nitride, silicon carbide, B, Pd, Ru, Rh, Au, MgF₂, LiF, C₂F₄, TiN, and compounds and alloys thereof." Finally, the Office Action contends that Applicants do not provide persuasive arguments or evidence as to why the claimed subject matter would not have been obvious to one of ordinary skill in the art in view of the teachings of applied references. Applicants respectfully disagree.

Applicants reiterate that Montcalm *et al.* are completely silent about the use of materials such as Boron (B), ruthenium (Ru), rhodium (Rh) and fluorides such as MgF₂, LiF and C₂F₄ and Montcalm *et al.* use carbon but does not disclose or suggest using diamond-like carbon (C). Furthermore, to establish a *prima facie* case of obviousness, three basic criteria must be met. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine the reference teachings. Second, there must be a reasonable expectation of success. Finally, the prior art reference (or references when combined) must teach or suggest all the claim limitations. (See MPEP 2143.) To establish *prima facie* obviousness of a claimed invention, all the claim limitations must be taught or suggested by the prior art. *In re Royka*, 490 F.2d 981, 180 USPQ 580 (CCPA 1974). "All words in a claim must be considered in judging the patentability of that claim against the prior art." *In re Wilson*, 424 F.2d 1382, 1385, 165 USPQ 494, 496 (CCPA 1970). See MPEP 2143.03.

Since neither reference, taken alone or in combination, teaches or suggests the relatively inert material is selected from the group consisting of: diamond-like carbon, Ru, Rh, B, TiN, MgF₂, LiF, C₂F₄ and compounds and alloys thereof, Applicants respectfully submit that the Office Action fails to present a *prima-facie* case of obviousness.

Therefore, Applicants respectfully submit that claim 1 and 15 are patentable and respectfully request that § 103(a) rejection of claims 1 and 15 be withdrawn.

Claims 2-10, 14 and 16-19 are dependent directly or indirectly upon patentable claim 1. Therefore, claims 2-10, 14 and 16-19 are patentable for at least the reason they contain all the limitations of claim 1. Therefore, Applicants respectfully submit that claims 2-10, 14 and

16-19 are patentable and respectfully request that the § 103(a) rejection of claims 2-10, 14 and 16-19 be withdrawn.

With respect to claims 20 and 30, in response to the Amendment filed July 26, 2002, the Office Action contends one having skill in the art would understand that an optical element as taught by Montcalm *et al.* can be a sensor (claim 20) or a reflector (claim 30) and having a multilayer coating. Applicants respectfully disagree.

Montcalm *et al.* are completely silent about providing a sensor with a surface covered with a capping layer, the capping layer formed of a relatively inert material. In fact Montcalm *et al.* teach away from a sensor by making reference to producing "reflective coatings" such as capped multilayer mirrors (see for example col. 2, lines 34-35 in Montcalm). Thus, it is respectfully submitted that one of ordinary skill in the art would not have been motivated to use the reflective coating of Montcalm *et al.* in a sensor.

With regard to claim 30, the reflector recited in claim 30 has a multilayer coating having only a capping layer (monolayer). In contrast, Montcalm *et al.* show using a reflective coating having a bilayer as a capping layer. Montcalm *et al.* do not teach or suggest using one capping layer. Applicants have determined through experimentation (see for example tables 5 and 6 and related description at page 17 of the specification) that the use of a single layer allows production of a reflective layer with improved reflectivity while exhibiting a high degree of resistance to chemical attack (see, page 17, lines 24-26 in the specification).

Therefore, for at least the above reasons, Applicants respectfully submit that claims 20 and 30 are patentable and respectfully request that § 103(a) rejection of claims 20-40 be withdrawn.

Claims 21-29 depend directly or indirectly from allowable claim 20. Therefore, claims 21-29 are patentable for at least the reason that claims 21-29 contain all the limitations of claim 20. Claims 31-40 depend directly or indirectly from allowable claim 30. Therefore, claims 31-40 are patentable for at least the reason that claims 31-40 contain all the limitations of claim 30.

Therefore, Applicants respectfully submit claims 21-29 and 31-40 which depend from either claim 20 or claim 30 are patentable and respectfully request that § 103(a) rejection of claims 21-29 and 31-40 be withdrawn.

CONCLUSION

In view of the foregoing, the claims are now in form for allowance, and such action is hereby solicited. If any point remains in issue which the Examiner feels may be best resolved through a personal or telephone interview, he is kindly requested to contact the undersigned at the telephone number listed below.

Attached is a marked-up version of the changes made to the specification and claims by the current amendment. The attached Appendix is captioned **"Version with markings to show changes made"**.

All objections and rejections having been addressed, it is respectfully submitted that the present application is in a condition for allowance and a Notice to that effect is earnestly solicited.

Respectfully submitted,

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Enclosures: Appendix

APPENDIX: VERSION WITH MARKINGS TO SHOW CHANGES MADE

IN THE CLAIMS

The claims have been amended as shown below:

Please enter amended claims 1, 15, 21, 39 and 43 as follows:

1. (Three Times Amended) A lithographic projection apparatus, comprising:
 - an illumination system constructed and arranged to supply a projection beam of radiation;
 - a first object table provided with a first object holder constructed and arranged to hold a mask;
 - a second object table provided with a second object holder constructed and arranged to hold a substrate;
 - a projection system constructed and arranged to utilize said radiation to image an irradiated portion of the mask onto a target portion of the substrate; and
 - at least one of said illumination system and projection system having an optical element with a surface on which radiation is incident and a capping layer covering said surface, said capping layer being formed of a relatively inert material,
 - wherein said relatively inert material is selected from the group [comprising] consisting of: diamond-like carbon, Ru, Rh, B, TiN, MgF₂, LiF, C₂F₄ and compounds and alloys thereof.

15. (Three Times Amended) A device manufacturing method using a lithographic apparatus, the method comprising:
 - providing a mask containing a pattern to a first object table;
 - providing a substrate at least partially covered by a layer of energy-sensitive material to a second object table; and
 - irradiating said mask and imaging irradiated portions of said pattern onto said substrate;
 - said irradiating comprising directing radiation onto a surface of an optical element, the surface having a capping layer formed of a relatively inert material,

wherein said relatively inert material is selected from the group [comprising] consisting of: diamond-like carbon, Ru, Rh, B, TiN, MgF₂, LiF, C₂F₄ and compounds and alloys thereof.

21. (Amended) The lithographic projection apparatus according to claim 20, wherein said relatively inert material is selected from the group [comprising] consisting of: diamond-like carbon (C), boron-nitride (BN), boron carbide (B₄C), silicon nitride (Si₃N₄), silicon carbide (SiC), B, Pd, Ru, Rh, Au, MgF₂, LiF, C₂F₄, TiN and compounds and alloys thereof.

39. (Amended) The lithographic projection apparatus according to claim 30, wherein said relatively inert material is selected from the group [comprising] consisting of: diamond-like carbon (C), boron-nitride (BN), boron carbide (B₄C), silicon nitride (Si₃N₄), silicon carbide (SiC), B, Pd, Ru, Rh, Au, MgF₂, LiF, C₂F₄, TiN and compounds and alloys thereof.

43. (Amended) The lithographic projection apparatus according to claim 42, wherein said first material is one or more materials selected from the group [comprising] consisting of Mo, Ru, Rh, Nb, Pd, Y and Zr, as well as compounds and alloys of these elements;

said second material is one or more materials selected from the group [comprising] consisting of Be, Si, Sr, Rb, RbCl and P, as well as compounds and alloys thereof;

said third material is selected from the group [comprising] consisting of B₄C, BN, diamond-like carbon (C), Si₃N₄ and SiC; and

said fourth material is selected from the group [comprising] consisting of Au, Ru, Rh, Pd, B, MgF₂, LiF, C₂F₄, TiN, boron nitride (BN), boron carbide (B₄C₉), silicon nitride (Si₃N₄), Silicon carbide (SiC), diamond-like carbon (C), and compounds and alloys thereof.

End of Appendix